FACTORS INFLUENCING CAESAREAN SECTION DELIVERY IN WOMEN WITH ONE PREVIOUS LOWER SEGMENT CAESAREAN SECTION

by

WAN NUR HAJIDAH BINTI W MOHD HAZMAN

Thesis submitted in fulfillment of the requirements
for the degree of
Master of Sciences of Medical Statistics

April 2018

ACKNOWLEDGMENT

In the name of Allah, the Most Gracious and the Most Merciful.

Alhamdulillah, all praises to Allah for the strengths and His blessing in completing this thesis. Special appreciation goes to my main supervisor, Dr. Siti Azrin Ab. Hamid for her supervision and constant support. Her invaluable help of constructive comments and suggestions throughout the completion of the thesis works have contributed a lot to this research. Not forgotten, my appreciation to my co-supervisors, Prof Norsa'adah Bachok from Unit Biostatistics and Research Methodology as well as Dr. Fauziah Jummaat, a clinical specialist from Obstetrics and Gynecology Department for their endless supports and knowledge regarding this topic.

My acknowledgment also goes to all the lecturers and office staffs in the Unit of Biostatistics and Research Methodology for their co-operation and guidance. Sincere thanks to all my colleagues for their knowledge sharing and moral support during my study. Thanks for the friendship and memories. Last but not least, my deepest gratitude goes to my beloved mother; Mrs. Wan Fauziah W Hasan and also to my siblings for their endless love, prayers, and encouragement. To those who indirectly contributed to this research, your kindness means a lot to me. Thank you very much.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ACOG	American Congress of Obstetricians and Gynecologists
AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
BMI	Body Mass Index
CI	Confidence Interval
ERCS	Elective Repeat Caesarean Section
JEPeM	Jabatan Etika Penyelidikan Manusia
LSCS	Lower Segment Caesarean Section
O&G	Obstetrics and Gynaecology
OR	Odds Ratio
RANZCOG	Royal Australia & New Zealand College of Gynaecology
RCOG	Royal College of Gynaecology
ROC	Receiver Operating Characteristic
SD	Standard Deviation
SE	Standard Error
USM	Universiti Sains Malaysia
VBAC	Vaginal Birth After Caesarean

VIF	Variance Inflation Factor
WHO	World Health Organization

FAKTOR MEMPENGARUHI PEMBEDAHAN "CAESAREAN" DALAM KALANGAN WANITA DENGAN SATU SEARAH PEMBEDAHAN "LOWER SEGMENT CAESAREAN SECTION"

ABSTRAK

Pengenalan: Pembedahan caesarean telah menjadi kebimbangan kerana kadar pembedahan caesarean telah meningkat di seluruh dunia. Salah satu penyumbang terbesar kepada peningkatan kadar pembedahan caesarean adalah wanita yang mempunyai satu sejarah pembedahan caesarean. Tujuan penyelidikan ini adalah untuk menentukan nisbah dan faktor berkait cara kelahiran dalam kalangan wanita yang mempunyai satu sejarah pembedahan *'lower segment caesarean section (LSCS)'* di Hospital USM, Kubang Kerian.

Metodologi: Sebuah kajian retrospektif ini telah dijalankan di Hospital USM dengan memeriksa laporan kesihatan dengan cara rektrospektif terhadap cara kelahiran dalam kalangan wanita yang mempunyai satu sejarah pembedahan 'lower segment caesarean section' yang mengikuti rawatan susulan dan melahirkan kandungan terkini di Hospital USM. Semua informasi pesakit mengenai faktor socio-demografik, faktor ibu, faktor bayi dan juga cara kelahiran dicatat. Cara kelahiran bayi telah dibahagikan kepada dua kumpulan iaitu kelahiran melalui faraj dan pembedahan kecemasan LSCS. Statistik deskriptif dan Regresi Logistik Binari telah digunakan untuk kajian ini menggunakan STATA SE 14.

Keputusan: Nisbah cara kelahiran adalah 0.5 untuk kedua-dua kelahiran melalui faraj dan pembedahan kecemasan LSCS. Majoriti yang terlibat dalam kajian ini adalah Melayu

dengan purata ketinggian mereka adalah 153.20. Wanita primipara lebih memilih menjalankan perbedahan kecemasan. Faktor berkait dengan pembedahan caesarean adalah sejarah kelahiran melalui faraj (Nisbah odds terlaras (NOT)= 2.71; 95% CI: 1.60, 4.60; p<0.001), anggaran berat bayi (NOT=4.78; 95% CI: 2.45, 9.34; p<0.001) dan kehadiran air ketuban dicemari oleh mekonium (NOT=2.40; 95% CI: 1.33, 4.35; p=0.004).

Kesimpulan: Wanita yang tidak mempunyai sejarah kelahiran melalui faraj, anggaran berat bayi melebihi 3500 gram dan yang telah terkena air ketuban dicemari oleh mekonium mempunyai lebih risiko untuk melahirkan melalui pembedahan kecemasan LSCS.

Kata Kunci: pembedahan caesarean, VBAC, TOLAC, sejarah kelahiran melalui faraj, anggaran berat bayi, mekonium, regresi logistic binari

FACTORS INFLUENCING CAESAREAN SECTION IN WOMEN WITH ONE PREVIOUS LOWER SEGMENT CAESAREAN SECTION

ABSTRACT

Introduction: Caesarean deliveries is becoming a worldwide concern as the rate is kept widespread globally. One of the biggest contributions to the rising caesarean section rate was women with one previous caesarean section. The aim of the study was to assess the proportion and its associated factors of the mode of delivery among women with one previous lower segment caesarean section (LSCS) at Hospital USM, Kubang Kerian.

Methods: A retrospective cohort study was conducted at Hospital USM involved retrospective records review of women with one previous LSCS who follow up and delivered their current pregnancy at Hospital USM. All the information about patients regarding their socio-demographic, maternal, neonatal characteristics and the mode of delivery as outcome variable were extracted. The mode of delivery was categorised into two groups which were a vaginal delivery and emergency LSCS. Descriptive statistics and Multiple Binary Logistic Regression were applied using STATA SE 14.

Results: The percentage of the mode of delivery were 50% of women had a vaginal delivery and 50% of emergency LSCS. Majority of the women who included in this study was Malay and their average height was 153.20. The most of primipara women had undergone emergency LSCS (82%). Factors associated with the caesarean section were history of vaginal delivery (Adjusted OR=2.71; 95% CI: 1.60, 4.60; $p<0.001$), fetal weight estimation (Adjusted OR=4.78; 95% CI: 2.45, 9.34; $p<0.001$) and the presence of meconium-stained liquor (Adjusted OR=2.40; 95% CI: 1.33, 4.35; $p=0.004$).

Conclusion: Women who had no history of vaginal delivery, their estimated fetal weight more than 3500 grams and been stained by meconium liquor were more likely to give birth via emergency LSCS.

Keywords: caesarean section, VBAC, TOLAC, history of vaginal delivery, estimated fetal weight, meconium stained liquor, logistic regression

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Caesarean deliveries are becoming a worldwide concern as the rate is kept widespread globally (Macfarlane and Dattani, 2013). For this reason, World Health Organization (WHO) and United Nations Children's Fund (UNICEF) had set a maximum of the caesarean section which is 15% of the predicted births (WHO and UNICEF, 2009). A controversy maxim "once a caesarean always a caesarean" stated by Cragin (1916) is true if only applied to certain cases, and trial of labour after caesarean is a reasonable option for women without any further complications (Krispin *et al.*, 2018).

The overall caesarean delivery rate in England from 2012 to 2013 was 25.5% which 14.8% were emergency and 10.7% were elective caesarean birth (RCOG, 2014). In the United States, caesarean section deliveries are being a frequent procedure as it happens one in every three births (King *et al.*, 2015). Australia and New Zealand also reported the rising rate of the caesarean section over decades in 2010 and 2011 respectively (RANZCOG, 2015)

The prevalence of caesarean delivery in the world determined that Asian has the second lower rate which is 19.2% (Betran *et al.*, 2016). While in Malaysia, it has increased rapidly to 15.7% from 10.5% in five years and Melaka was the biggest contribution to the rising rate (Ravindran, 2008).

Even though vaginal birth after caesarean (VBAC) is known as a recommended option, the rate of caesarean section is still rising because of repetitive caesarean section as the biggest contribution (Guise *et al.,* 2010; Macfarlane and Dattani, 2013). Caesarean section deliveries are harming the life of mothers and their babies (Villar *et al.*, 2007). The proportion of women who refused VBAC also increase the incidence of caesarean delivery (Bhide *et al.*, 2016) and they refused due to concern about their safety (Landon *et al.*, 2004). Guise *et al.* (2010) mentioned there were 76.3% of the success rate of VBAC and it is in the range of 49 to 87%. The rate of successful VBAC and rate of trials of labour been decreasing even though vaginal birth after caesarean is an acknowledged procedure (Paga and Kumari, 2017).

It is clinically proven that women with one previous lower segment caesarean delivery are safe to opt for vaginal delivery (RCOG, 2014). It also reported that it is significantly important to reduce the caesarean rate (Gupta *et al.*, 2015). Paga and Kumari (2017) in their study revealed that patients are still opted to attempt a trial of labour, nonetheless, there is a risk of uterine rupture and it leads to a successful procedure for certain cases.

A study by Balachandran *et al.* (2014) found that those with the previous caesarean scar is formed as a very risky group in obstetrics, with associated medical and legal implications. Successful VBAC has lower morbidity than repeat caesarean delivery in terms of having fewer transfusions, fewer postpartum infections, fewer cases of hysterectomy and even death (Bucklin, 2003). Maternal death with planned VBAC has a low risk (4/100,000) than elective repeat caesarean section (ERCS) which is 13/100,000

(Guise *et al.*, 2010). Risk of transient respiratory morbidity has 2-3% for VBAC (RCOG, 2014) while for ERCS, the risk is can be up to 6% if delivered at 38 instead of 39 weeks (Aiken *et al.*, 2014). For VBAC, it has 0.04% of the risk of delivery-related perinatal death while less than 0.01% risk of delivery-related perinatal death or neonatal hypoxic-ischaemic encephalopathy (Krispin *et al.*) for ERCS (RCOG, 2014).

Assisted delivery is using instrumental either ventouse or forceps is to help shorten the second stage of labour. Instrumental vaginal deliveries increase the risk of obstetric trauma (Indicators, 2015). Nonetheless, assisted delivery have maternal and fetal complications. The mothers will face the risks of vaginal trauma, postpartum haemorrhage, urinary tract injury and damage to the pelvic floor and anal sphincter. Complications may occur in the fetus are shoulder dystocia, subgaleal haemorrhage, skull fracture and cervical spine injury. These complications may affect long hospital admission of neonatal unit and related to feeding and bonding problem (RCOG, 2011; RANZCOG, 2016). Therefore, mothers may fear to have more childbirth as they might be developed tokophobia which means post-traumatic stress-type syndrome (RCOG, 2011). Hence, assisted vaginal delivery has significantly more risk than spontaneous vaginal delivery.

This is agreed by a Malaysian study which also stated assisted vaginal delivery and caesarean section are associated with infant and maternal complication with indistinct advantages(Sheamini *et al.*, 2010). Consequently, women should choose spontaneous vaginal delivery after caesarean section to avoid the consequences of multiple caesarean sections (Dhillon *et al.*, 2017).

A study done in Oman has shown that one third (33%) of the contribution to total caesarean section was made by women with one previous caesarean section (Kazmi *et al.*, 2012). About 173 women out of 297 repeated the caesarean section. With all the rising caesarean section rates from all over the countries, therefore women with the previous caesarean section also increase and consequently likely to face problem in pregnancy later (Negara and Sujana, 2017).

1.2 The Burden of Caesarean Section

Serious and permanent complications, disability or deaths can happen that caused by caesarean sections deliveries, mainly there are lacks facilities or capacity to conduct safe surgery and treat surgical complications accordingly (Betran *et al.*, 2016).

There is still a concern regarding maternal and perinatal morbidity and mortality even though successful vaginal birth after the caesarean rate is increasing (Raja *et al.*, 2013). Caesarean section deliveries are associated with massive primary post-partum haemorrhage (Ravichandran, 2012). It the highest rate for both years than vaginal delivery. WHO study showed that caesarean section deliveries are similar with any other surgery, it has a short and long-term risk, which it can affect the health of mother and child and also current and future pregnancies (Betran *et al.*, 2016).

A caesarean section done in the second stage of labour has a higher risk compared than in the first stage. Mothers might have complications, including tears (RCOG, 2014). It also indicated that there is a lower risk of neonatal respiratory morbidities if patients chosen for vaginal birth after caesarean (Gupta *et al.*, 2015). Additionally, there are likely complications would happen in future including uterine scar and related risks with repetitive caesarean section (RANZCOG, 2016)

1.3 Problem Statement

There is a higher proportion of pregnant women with one previous scar was undergone the emergency caesarean. WHO (2015) reported that there is higher than 10% of caesarean delivery rates are not associated with the maternal and neonatal mortality reduction. The rising rate also caused by the refusal of the trial of labour because they were afraid of prolonged labour and the painful experience during their last delivery.

Caesarean sections have many ambiguous health consequences on another outcome, for example, maternal and perinatal morbidity, pediatric and psychological or social health (Betran *et al.*, 2016). Therefore, there is more needed research to conduct to understand the health effects of caesarean section on immediate and future outcomes.

To date, there are limited studies of the mode of women with one previous LSCS. Most of the previous studies done analysed using descriptive and Pearson Chi-Square analysis. The studies that used logistic regression are on occasionally either they study predicting successful VBAC or VBAC and ERCS. Previous studies also identified different significant factors.

There is a need to reduce the rate of caesarean section and it can be accomplished by trying a trial of labour if there are no serious complications and also it is safer for the baby (Shakti *et al.*, 2006). Abdelazim *et al.* (2014) also supported that it is the essential choice for women in developing countries to choose a trial of labour for the next delivery to reduce the cost and morbidities of a repetitive caesarean section.

1.4 Justification of the Study

By identifying the associated factors for vaginal delivery allow further recommendation on prevention of ECRS in a local setting. Necessary actions could be suggested based on the study findings to reduce and prevent the ECRS if the mothers having no complications. Women who undergo succeed trial of labour may have a shorter length of hospital stay and postpartum recovery, fewer complications, such as postpartum fever, wound or uterine infection, thromboembolism, need for blood transfusion, fewer neonatal respiratory problems (Cunningham and Wells, 2013). It is supported by Paga and Kumari (2017) and also they added that expenditure involved for undergoing vaginal delivery is fewer compared to caesarean section delivery.

Yet, there are limited studies available in Malaysia regarding the mode of delivery. Therefore, hopefully, this study gave additional significant information and become a reference for future studies.

1.5 Research Questions

1. What was the proportion of caesarean section among women with one previous LSCS in Hospital USM?

2. What were the associated factors of caesarean section among women with one previous LSCS in Hospital USM?

1.6 General Objective

To assess the proportion and associated factors of caesarean section among women with one previous LSCS.

1.7 Specific Objectives

1. To determine the proportion of caesarean section among women with one previous LSCS in Hospital USM.

2. To identify the associated factors of caesarean section among women with one previous LSCS in Hospital USM.

1.8 Hypotheses Statement

There were significant associations between socio-demographic, maternal and neonatal characteristics with caesarean section among women with one previous LSCS in Hospital USM.

CHAPTER 2: LITERATURE REVIEW

2.1 CAESAREAN SECTION

Caesarean section is a common procedure. It is medically showed when there is risk for mother and fetus if the surgery did not perform in a given time (Penna and Arulkumaran, 2003). There are many types of caesarean section, however the most frequent was lower segment caesarean section. If the mothers were having prolonged labour and unexpected complication during labour, so the emergency caesarean section will take place. Usually, if there are any medical or obstetric problems, women will opt to perform planned caesarean section in avoiding serious complications happened during labour (Paterson-Brown, 1998).

2.2 Indications of Caesarean Section

The rising rate of caesarean made many parties in the world to make efforts to study the trend and to solve the problems. Many studies published their studies regarding the associated factors that influenced the caesarean section, however, the indications of caesarean section were not clearly defined (Mylonas and Friese, 2015).

According to Geidam *et al.* (2009), most of the indication for caesarean section was because of maternal complication (76.1%) while fetal complication was only 23.9%. the two common indications of maternal complications were cephalopelvic disproportion and previous caesarean. Fetal complications were leading by fetal distress. Nowadays, the study reported that many mothers were keen for the elective caesarean section. Maternal

request on elective caesarean section was not contradicted with any contradiction of medical and obstetrics (Mylonas and Friese, 2015).

There are many complications for women with a previous classical scar or previous uterine rupture. They are contradicted to try a trial of labour but if they keen to try, they need to discuss case-by-case with obstetricians because they are exposed to the risk of adverse maternal for example recurrent uterine rupture and placenta previa (Penn and Ghaem-Maghami, 2001).

The malpresentation of baby also contributes to the rising rate of caesarean section. When the position of the baby in an abnormal lie, it makes a vaginal delivery is impossible as it will cause life-threatening to the baby due to fetal distress (RCOG, 2014). There were two to five times higher for vaginal delivery when non-cephalic presentation as compared to the planned caesarean section after excluding the fetal anomalies (Penn and Ghaem-Maghami, 2001).

Congenital anomalies were more likely to have caesarean rates. Babies with the congenital problem might require the assistance of pediatric specialist during labour, therefore it is less risky for them if they planned their delivery as they need comprehensive facility (Penn and Ghaem-Maghami, 2001; Hannah *et al.*, 2004).

Despite all the contraindication of medical and obstetrics towards a group of women, the trial of labour is a safe option for women without any complications as it said to have a lower risk compared to elective caesarean section.

2.3 Proportion of the Caesarean Section among Women with One Previous LSCS

In the United Arab Emirates, 83.4% has a success rate of vaginal birth after caesarean where 92.7% is through spontaneous vaginal delivery and the rest (7.3%) is through assisted vaginal birth using ventouse (Balachandran *et al.*, 2014). A Malaysian study reported by Tan *et al.* (2007) stated that out of 768, 71.2% was vaginal delivery which 63% was spontaneous and 8.2% were assisted deliveries while 28.8% was women undergone emergency caesarean section.

In the United Kingdom, 71.8% of women have successful vaginal delivery (Bhide *et al.*, 2016). About 77.2% of vaginal deliveries after caesarean was succeeded (Juhasz *et al.*, 2005). Yamani and Rouzi (1999) also stated that in Saudi Arabia, vaginal deliveries after caesarean was 76.9% and 23.1% women underwent emergency caesarean section.

In India, 68.04% had successful VBAC and the balanced had emergency caesarean section (Paga and Kumari, 2017) whereas Shakti *et al.* (2006) reported that out of 237, most women had vacuum extraction (48.1%) and followed by emergency caesarean section (27.8%) while the least was SVD (8.8%). Dhillon *et al.* (2017) indicated that 4035 women from 30 teaching hospitals were included in their study and 62.3% of them had given birth vaginally and 37.7% had undergone emergency caesarean section mostly caused of abnormal presentations, placenta previa, and severe intrauterine growth retardation.

There are many reasons of increasing caesarean section such as widen the use of electronic fetal heart rate monitor during labour, lack of skills of assisted vaginal delivery and vaginal breech birth and also avoid of a lawsuit (Mastrobattista, 1999).

As stated by Chan *et al.* (2007), 56.6% women opted for the elective caesarean section because they had a history of caesarean section and only 13.9% women who had a previous caesarean section underwent emergency caesarean section. A study revealed that the significant reason for the overall caesarean section rate in Latin America was women chose elective caesarean section since they had a history of caesarean section (Betrán *et al.*, 2009). An Australian study reported that their caesarean section rates are increasingly high as well as an international rate (Hure *et al.*, 2017). The rates are high beyond the medically indicated as it is could jeopardize mother and her children's life and increase the fare of maternal and neonatal care.

There were many problems with a spontaneous vaginal delivery that women might face, for example, perineal trauma and long-term issues. Their pelvic muscle may weaken and lead to prolapse and incontinence. Women who might need emergency caesarean section may be associated with the problem of deceleration of CTG and failure to progress during vaginal labour (Dodd *et al.*, 2007).

Caesarean birth is usually corresponding to the risk of maternal complications. The complications might happen during birth were haemorrhage, need for blood transfusion, septicemia, weaken the pelvic muscle and deep venous thrombosis. These complications

are a higher risk of emergency caesarean birth compared to both complications of vaginal and elective caesarean birth (Dodd *et al.*, 2007).

2.4 Associated Factors of the Caesarean Section

There are many studies had published on factors that were associated with the caesarean section. These were including socio-demographic characteristics, maternal characteristics include previous and current pregnancy and neonatal characteristics.

2.4.1 Socio-Demographic Characteristics

Annessi *et al.* (2016) reported that African has 47% less likely to have successful vaginal delivery as compared to White while controlling Asian and others. Nonetheless, in New Zealand, when Maori, Pacific, Asian and Indian is compared to European, there is no ethnicity can predict the successful trial of labour (McDonald *et al.*, 2018). Bhide *et al.* (2016) stated that Asian is significantly associated with failed VBAC. While, in Malaysia, the majority of the women were Malay (55.9%) had successful vaginal delivery (Kalok *et al.*, 2017).

In China, maternal height was one of the factors that can influence the success of the trial of labour (Wen *et al.*, 2018). Women with shorter height were associated with emergency caesarean section (Smith *et al.*, 2005). This is also supported by a study in the United Kingdom, maternal height did influence the mode of delivery (Prasad and Al-Taher, 2002)

as they said 160cm was the best cut-off point for screening. However, according to Patel *et al.* (2017a), the height of mother is not associated with predicting trial of labour.

As stated by Grobman *et al.* (2007), women with lower body mass index (BMI) succeeded spontaneous vaginal delivery after caesarean compared to women with higher BMI (OR:0.96, 95% CI: 0.95, 0.97). It is supported by a study from Juhasz *et al.* (2005) which obese women are less likely to achieve vaginal deliveries. When BMI of mother increase will increase odds of predicting vaginal delivery by 4% less likely (95% CI: 0.93, 0.99; p=0.019) (Annessi *et al.*, 2016). Women with BMI less than 25 can influence successful VBAC (Yee *et al.*, 2015).

Definition of parity is the number of previous pregnancies which the mother had carried for more than 20 weeks (Bai *et al.*, 2002). According to Senturk *et al.* (2015) and Seffah and Adu-Bonsaffoh (2014), parity is one of the significant predictors of the success of VBAC. Primigravida during previous caesarean section was contributed more to repeat caesarean section compared to multipara (Acharya and Raut, 2017). Multipara is associated with higher rates of successful VBAC as they had a prior vaginal delivery. Balachandran *et al.* (2014) and Tan *et al.* (2008b) were agreed that higher parity from previous vaginal delivery can increase the success of VBAC.

A study by Dhillon *et al.* (2017) proved that gestational age was a predictor of vaginal birth after caesarean. They also added that women with gestational age of more than 37 weeks had better chance to opt for vaginal delivery. However, a study had revealed that gestational age at delivery was not associated with successful VBAC for women with one

previous caesarean section (Ram *et al.*, 2018). Although one study also identified gestational age more than 40 weeks have shown an increased risk of uterine rupture (Kiran *et al.*, 2006), there many studies proved having more than 40 weeks of gestational age is independently associated with the success of VBAC compared to less than 40 weeks (Hammoud *et al.*, 2004; Belihu *et al.*, 2017).

2.4.2 Maternal Characteristics

Maternal age is proved to be related to predicting vaginal delivery (Annessi *et al.*, 2016). Younger maternal age is a significant association between the mode of delivery (Belihu *et al.*, 2017). Furthermore, the advanced maternal age of more than 35 years old was significantly associated with a trial of labour (Grisaru-Granovsky *et al.*, 2018). However, it is opposed with a study done in Ghana because maternal age is associated with an unsuccessful trial of scar (Seffah and Adu-Bonsaffoh, 2014; Patel *et al.*, 2017a).

RCOG (2014) reported that successful VBAC can be determined by the factor of the history of vaginal delivery only. Patients with previous caesarean history were a significant predictor to determine successful vaginal delivery (Srinivas *et al.*, 2007; Olagbuji *et al.*, 2010; Alani *et al.*, 2017; Salim *et al.*, 2017). It is also shown by Guise *et al.* (2010) that having previous vaginal delivery had three times more likely to have successful VBAC as compared to women with no previous vaginal delivery. Women with previous vaginal delivery are known to increase the probability of successful VBAC (Mizrachi *et al.*, 2018). It proved by a study done in Saudi Arabia which 92.8% parturient who having history was undergoing successful vaginal deliveries (Yamani-Zamzami,

2007). The result of the study identified that women who did not have experience in vaginal delivery were estimated to be 3.5 likely to have a caesarean section (95% CI:2.2, 5,6; $p<0.001$).

There are two type of previous caesarean section that been studied, which were emergency caesarean section and elective caesarean section. Emergency CS is performed when there is a fetus or maternal problem after the onset of labour meanwhile elective CS is decided before the onset of labour (Prasad *et al.*, 2017). As stated by Paudyal *et al.* (2017), emergency LSCS is usually caused by fetal distress while elective LSCS was caused by women who have prior of caesarean section.

It is shown that the most indication of women who had previous LSCS was fetal distress and followed by a breech presentation (Faiz *et al.*, 2017; Anita *et al.*, 2018). Furthermore, contracted pelvis, suspected scar dehiscence, and fetal distress were the three most indications happened to women who repeat LSCS for the subsequent pregnancy (Akhtar *et al.*, 2017). While, in India, Patel *et al.* (2017b) and Wanjari (2017) outlined that the fetal distress is the most frequent indication and it is gradually increasing from 2008 to 2013.

When mothers had a short interval between pregnancy, they tend to fail VBAC. Alani *et al.* (2017) proved that it is one of significant predictor because mothers with minimum 18 months interval between delivery, their success rate would rise instead of mothers with less than 18 months. This is supported by Anita *et al.* (2018) that 61.5% of the women have more than two years interval of the interval between previous pregnancy and current

pregnancy was successful in VBAC compared to emergency LSCS which only has 38.5%. In the US, Zhang *et al.* (2017) reported that African-born women are having more risk when there is a short interval of pregnancy which was 6 months between the pregnancies compared to American-born white and black women. There was a reduction in successful of VBAC for women with more than 24 months which contradicted with 72% of women that has less than 24 months has successful VBAC (Rietveld *et al.*, 2017).

2.4.3 Neonatal Characteristics

Regarding neonatal birth weight, macrosomia or birth weight more than 4 kg is independently significant with VBAC (Belihu *et al.*, 2017) while a study by Balachandran *et al.* (2014) stated that average size babies which are between 2.5 kg till 3.9 kg has influenced toward VBAC. Abdelazim *et al.* (2014) and Wen *et al.* (2018) studied that estimated birth weight was a significant predictor of successful VBAC. A Malaysian study also mentioned from their result, a baby with the estimated birth weight of less than 3.5kg has an effect on successful VBAC even though it is not statistically proven (Kalok *et al.*, 2017). Despite that, Fox *et al.* (2018) revealed that estimated fetal weight was not able to predict vaginal delivery.

Failed vaginal delivery was associated with the presence of meconium-stained liquor (Birara and Gebrehiwot, 2013). The study said the meconium stained liquor was 2.19 higher odds to have failed vaginal delivery (95% CI: 1.28, 6.72). Meconium stained liquor was more likely happened during emergency LSCS as compared to vaginal delivery (Islam *et al.*, 2011). In Australia, it is reported conversely that older women had less

probability to get meconium liquor complication during emergency LSCS (Dunn *et al.*, 2017). Success VBAC can be determined by meconium-stained liquor (Tan *et al.*, 2008a).

2.5 Literature Search Strategy

Literature search strategy was used to find the high quality and relevant references for the study of interest in wide of databases and various search engines, for example, Google Scholar, UpToDate, PubMed and Science Direct. The strategy was to identify the keywords as it describes the subject areas and help to minimize the irrelevant studies. Using the synonyms because another author might use the different words and phrases with similar meaning. Other than that, the strategy also can use search features, Boolean operators, and citation search.

For this study, the phrases used were “factors associated with a trial of labour”, “factors associated with vaginal birth after caesarean” and “risk factor with the trial of labour”. Keywords combination and with Boolean operator were “factors associated” AND “trial of labour” OR “vaginal birth after caesarean”; and “risk factors” AND “trial of labour” OR “vaginal birth after caesarean”. Citation search was used by searching the name of author and title of articles. All the relevant references were imported into Endnote Library.

2.6 Conceptual Framework

Figure 2.1 summarises the conceptual framework of the study. All the variables are considered as independent variables and will be analyzed.

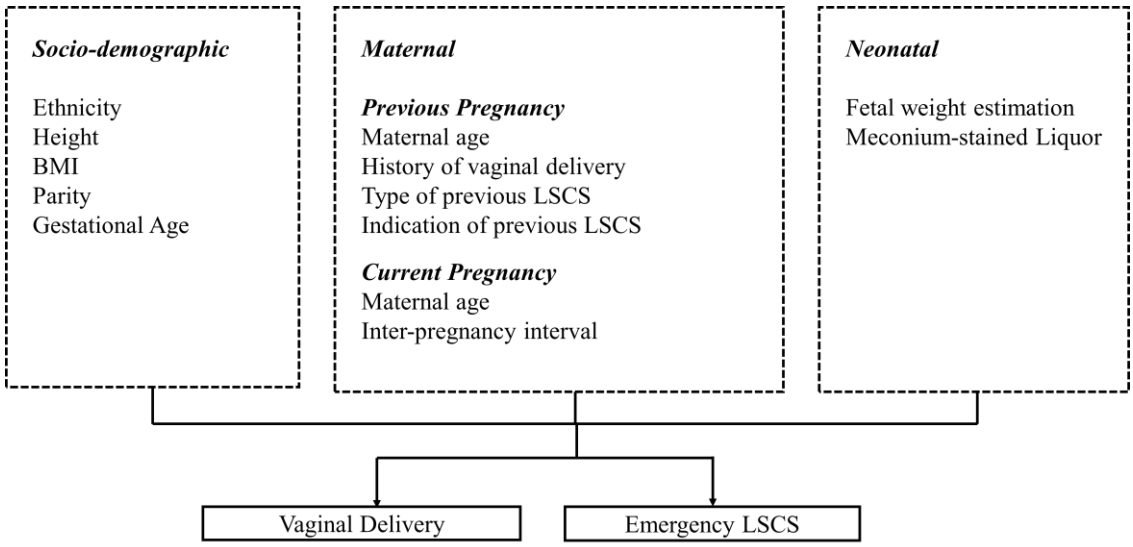

Figure 2. 1: Conceptual framework of associated factors of the caesarean section

CHAPTER 3: METHODOLOGY

3.1 Study Design

The study design was retrospective cohort study which was to determine the proportion and associated factors of the caesarean section among women with one previous LSCS who attended Hospital USM. This study tracked and reviewed patients' medical records to extract information of interest.

3.2 Study Location

This study was conducted in Hospital USM, Kelantan. Hospital USM is the tertiary hospital that received a referral from district hospitals especially women with a previous LSCS and conducted all the mode of the delivery. The average number of LSCS performed in Hospital USM was 1500 for each year. Obstetrics and Gynecology Clinic (O&G) received patients who were followed up and delivered for their previous and current pregnancy.

3.3 Study Duration

The study duration was begun from September 2017 until April 2018.

3.4 Study Population

3.4.1 Reference Population

The reference population for this study was all women with one previous LSCS in Kelantan.

3.4.2 Source Population

The source of the population was all women with one previous LSCS who attended Hospital USM.

3.4.3 Sampling Frame

The sampling frame was a list of all women with one previous LSCS who attended Hospital USM from 2016 until 2017.

3.4.4 Inclusion and Exclusion Criteria

The inclusion criteria for this study were all women with one previous LSCS either elective and an emergency caesarean section that aged 18 years and above, singleton pregnancy and were followed up and delivered in Hospital USM for their current deliveries.

The exclusion criteria for this study were women from the previous classical caesarean section. The study also excluded women with current pregnancy that had a preterm birth (less than 37 weeks), non-cephalic pregnancy, lethal fetal anomalies, uterine rupture and severe pre-eclampsia.

3.4.5 Sample Size Determination

The sample size was calculated based on the second objective. The determination of sample size was based on two proportion formula using Power and Sample Size Calculation (Dupont and Plummer Jr, 2010). The selected variables for calculation were considered based on the significant results from the previous studies. The parameters that were used in sample size determination using PS Software were:

i. **Level of significance (α)** is Type I error probability for a two-sided test (Dupont and Plummer Jr, 2010). This α is the probability of wrongly rejecting the null hypothesis when the null hypothesis is true. In this study, the α was set at 5%.

ii. **Power (1-β)** is the probability that the test will correctly identify a significant difference or effect or association in the sample should one exists in the population. The sample size is directly proportional to the power to detect the significance of the difference. In this study, 80% was used as power of the study.

iii. $\mathbf{P_0}$ is the proportion of spontaneous vaginal delivery (mode of delivery) in unexposed factors reported in the previous study.

iv. **P_1** is the proportion of spontaneous vaginal delivery (mode of delivery) in exposed factors based on expert opinion.

v. **m** is the ratio of spontaneous vaginal to delivery emergency caesarean section (mode of delivery) reported in the previous study.

Table 3. 1: Sample Size Determination

Associated Factors	P_0	P_1	m	n	Total sample size + 10% missing data
Maternal Age (Comparing <35 and ≥35) [a]	0.20	0.35	1.50	113	311
BMI (Comparing <25 and ≥25) [a]	0.45	0.60	1.00	173	381
Induction of Labour (Comparing yes and no) [c]	0.10	0.25	5.00	53	350
Type of Previous Caesarean (Comparing EmCS and ERCS) [a]	0.50	0.65	1.50	141	**388**
Neonatal Birthweight (Comparing <4000g and ≥4000g) [b]	0.10	0.22	1.50	118	325

[a] (Kyaing *et al.*, 2016)

[b] (Balachandran *et al.*, 2014)

[c] (Dhillon *et al.*, 2017)

The 10% of data were adding to the sample size after considering missing form, incomplete data and the possibility of data error. Based on the sample size determination result (Table 3.1), the minimum sample size required for this study after adding 10% missing value is 388.